MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2022 / 2023 (TERM ID 2220)

PPS0335 – PROBLEM SOLVING AND PROGRAMMING

(Foundation in Information Technology)

3 JULY 2023
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 4 pages (excluding the cover page) with 5 questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

QUESTION 1 [10 Marks]

a. List the **SIX (6)** problem-solving steps to ensure the best possible solution to a problem.

(3 marks)

b. To calculate the perimeter of a rectangle is an example of a problem with algorithmic solution and to increase profits in a business is an example of problem with heuristic solution. Explain why the two problems have different types of solutions.

(2 marks)

c. Before a program can be executed, we need to compile the program beforehand. Briefly explain the compilation process.

(2 marks)

d. Determine whether the algorithmic or the heuristic solution is the best solution approach for each of the problems below. Briefly discuss your answer.
   i. To buy a folding bike.
   ii. To install Windows 11 operating system to a Microsoft Surface Pro 9.
   iii. To choose the best restaurant in Ayer Keroh district.
   iv. To clean house air conditioner.

(3 marks)

QUESTION 2 [10 Marks]

a. What data types would you use to represent the following items:
   i. Number of road bikes at the botanical garden parking space.
   ii. A letter grade on a practical test.
   iii. The cyclist average speed of "Le Tour De Langkawi".
   iv. Malaysian armed forces identification card (ID).

(2 marks)

b. What are the results of the following operations?

	Operation	Result
i.	NOT (True AND False)	
ii.	(7 + 8) * 3.2	
iii.	5/2.0 * 4	
iv.	3 + 20 MOD 4	

(2 marks)

c. Write computer equations for the following problems. Use the variables (bold and italic) indicated in the questions to create the equations.
   i. Kamala Khan bought 2 packages of candy for ***X*** Ringgit each and 3 packages of chocolate for Y Ringgit each. How much does she has to pay for all the items she bought?

Continued...

ii. The product of the two numbers is 168. If the first number is X, what is the second number?
iii. Carol Danver is renting a car for X days and the rental rate per day is 80.00 Ringgit. She needs to pay a 10% deposit of the total rental. What is the balance, she has to pay?
iv. Monica Rambeau borrowed Y Ringgit for a new television. She has paid 3/4 of the debt. How much does she still owe?

(4 marks)

d. Setup a logical expression for the following conditions.
i. To join the cycling fun ride a participant must come from Sabah or Sarawak only.
ii. The admission ticket to a butterfly park for children heights below 80cm is free.

(2 marks)

QUESTION 3 [10 Marks]

a. Construct Input Processing Output (IPO) to find the sum S, average A, and the product P of three integers J, K, and L. Assumed that all integers are obtained from the user.

(3 marks)

b. Refer to **Figure 1**. A circle is inscribed in a square with a side length of 4. Develop a problem analysis chart (PAC) to find the area of the shaded region.

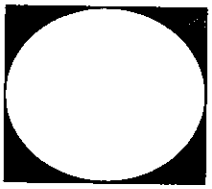

Figure 1

(3 marks)

c. Why it is important to test and validate a solution before converting it into a program?

(2 marks)

d. A program has been tested and all errors are corrected. Briefly explain what type of errors could still occur when the program is executed.

(2 marks)

Continued...

QUESTION 4 [10 Marks]

a. Frank Lucas teaches science class, and his students are required to take three tests. He wants to write a program that can be used to calculate a student's average test score. He also wants the program to congratulate the student enthusiastically if the average is greater than 95. Here is the algorithm:

1. Get the first test score.
2. Get the second test score.
3. Get the third test score.
4. Calculate the average.
5. Display the average.
6. If the average is greater than 95, congratulate the user.

Write a pseudocode based on the algorithm given above.

(3 marks)

b. Draw a flowchart for the problem in Question 4(a) above.

(3 marks)

c. A software company sells a software suite package that retails RM200. Quantity and discounts are given according to the information in **Table 1**. Write a pseudocode to ask for the number of units sold and compute the total cost of the purchase. Use positive-logic structure for the decision control statements.

Table 1

Quantity	Discount
10 - 19	20%
20 - 49	30%
50 - 99	40%
100 or more	50%

(4 marks)

QUESTION 5 [10 Marks]

a. You write a program that simulates a soft drink vending machine. The main program has the following functions:

- displayMenu() – to display a menu of drink names and prices.
- chooseMenu() – to return ***option*** based on displayMenu( ). The option entered is just a single character.
- selectDrink() – to return ***price*** of drink based on selected option from chooseMenu()
- quantityDrink() – to return ***quantity*** of drink to buy.

Continued...

- inputMoney() - to accept and validate the amount of money inserted. If the amount of money is less than the total price of the drinks, repeatedly ask the user to insert more money until the money is enough. If the amount of money is equal to or more than the total price of the drinks, print the balance returned to the user and an appropriate message such as "Here is your beverage".

Develop a flowchart for the inputMoney() function only. Use the variables suggested in ***bold*** (if necessary) to complete the flowchart.

(4 marks)

b. Change the following pseudocode to flowchart.

```
start:
    total = 0
    loop: counter = 1 to 50 step 1
        read height
        if (height >= 150)
            total = total + 1
        endif
    loop-end: counter
end:
```

(3 marks)

c. Suppose we want to display all the digits 101,91,81,...,-89,-99,-109 in descending order. Use the repetition control structure *while* in order to write a pseudocode.

(3 marks)

End of Paper